

Panoramic Image Reflection Removal

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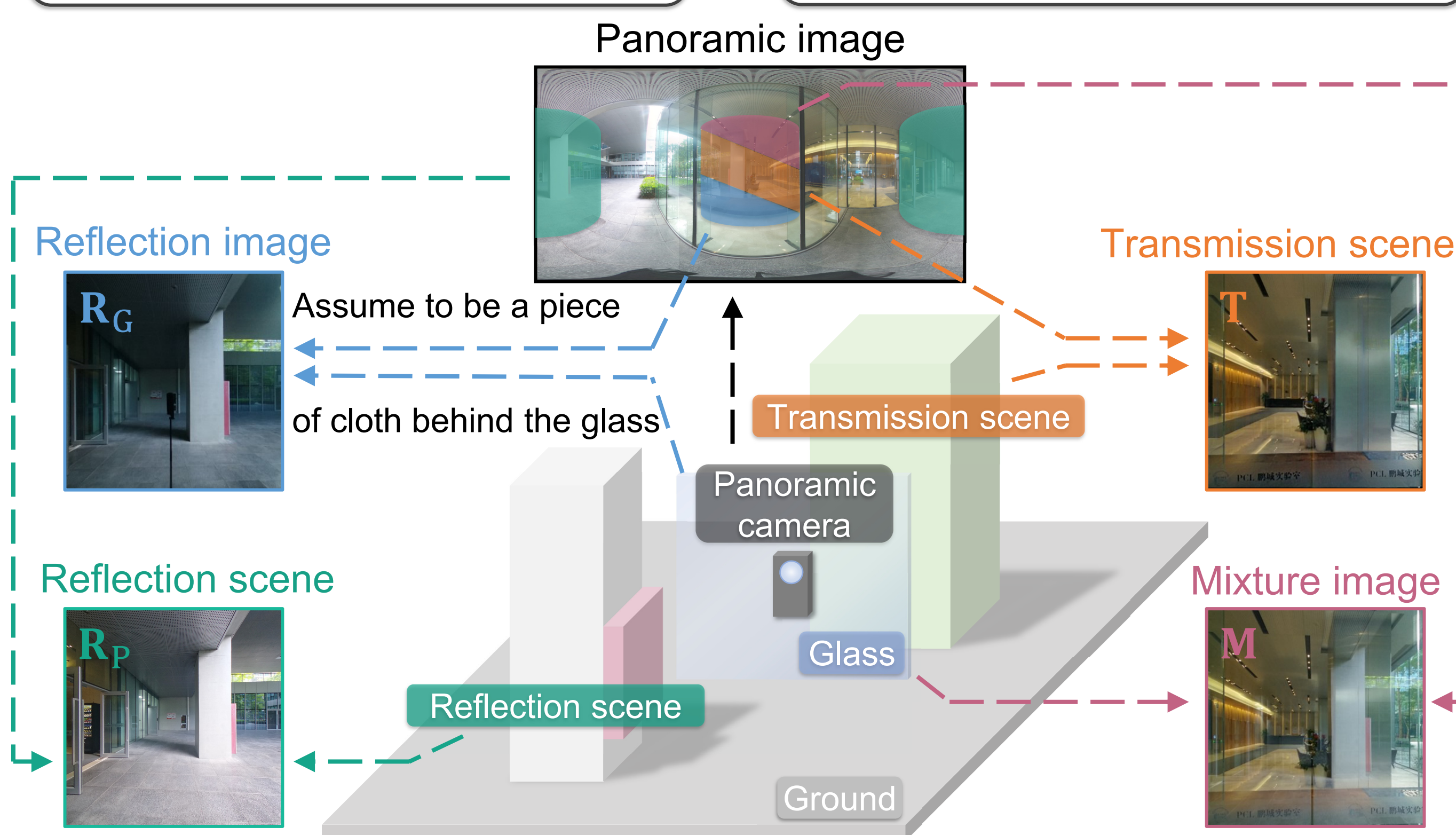
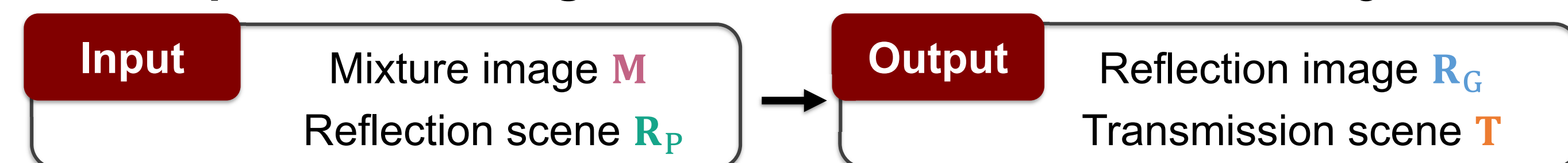
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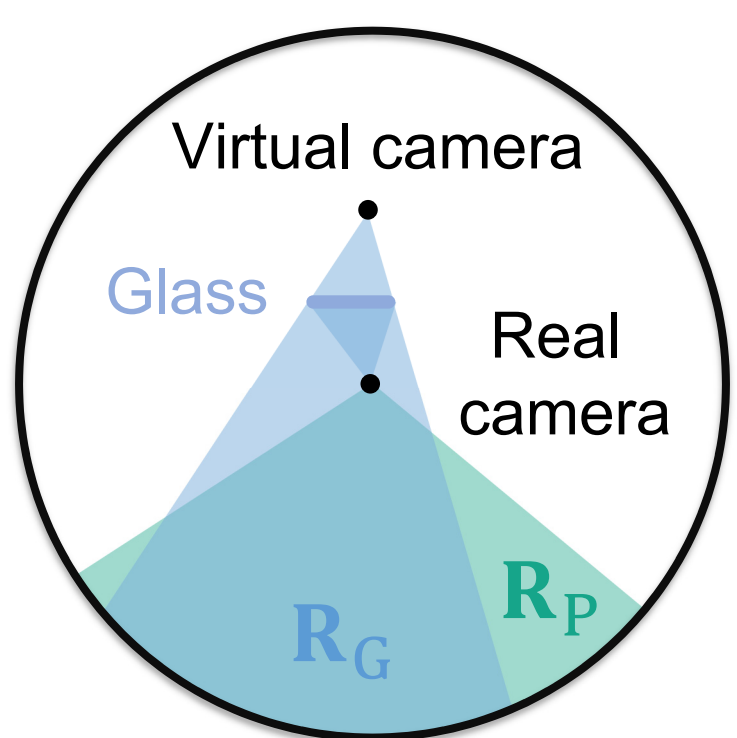
PROBLEM DESCRIPTION

Given a **panoramic image** with reflection contamination, our goal is:



MISALIGNMENT ISSUES

Between the **glass-viewed reflection image** R_G and the **panoramic-viewed reflection scene** R_P , there exists **geometric** (caused by different viewpoints of the real and virtual camera) and **photometric** (caused by light attenuation and the camera pipeline) misalignment.



Geometric misalignment

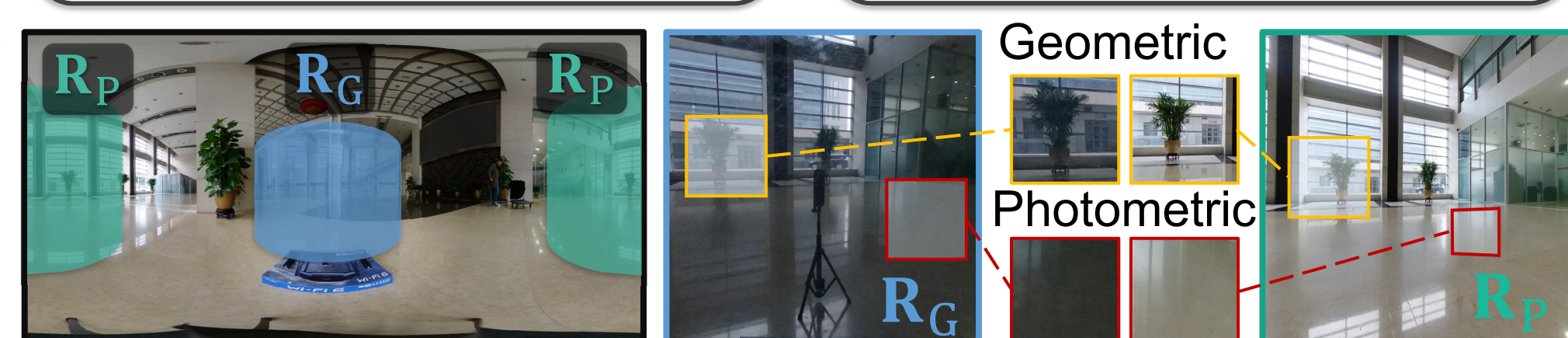
$$R_G \approx \mathcal{C}(\mathcal{T}(R_P))$$

Image cropping / Affine transformation

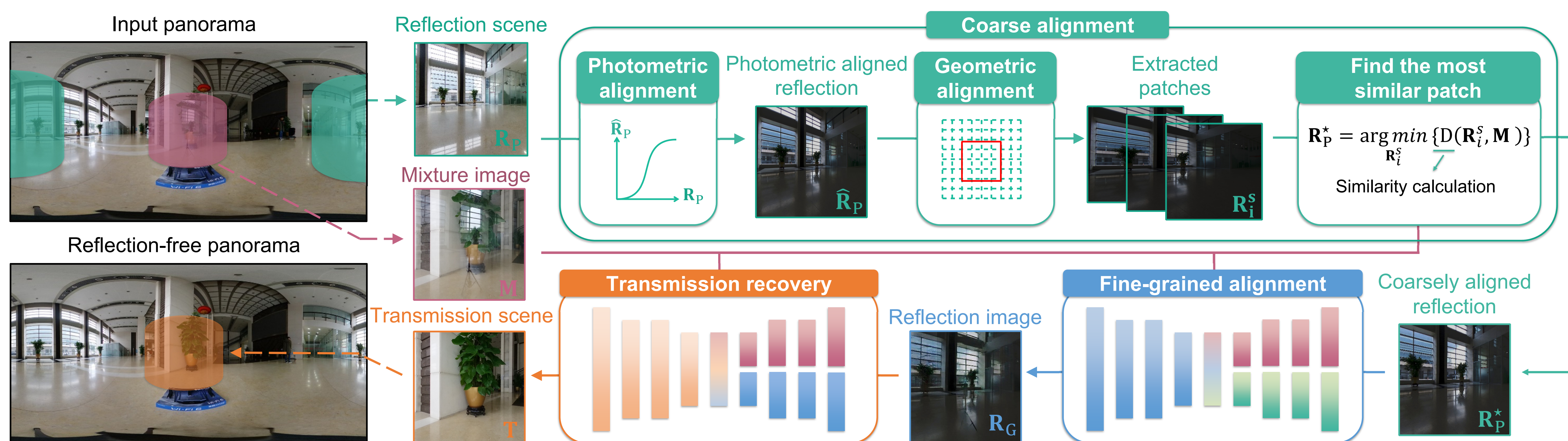
Photometric misalignment

$$R_G \approx \mathcal{F}(\Omega * R_P)$$

Non-linear transformation / Coefficient map



PROPOSED METHOD

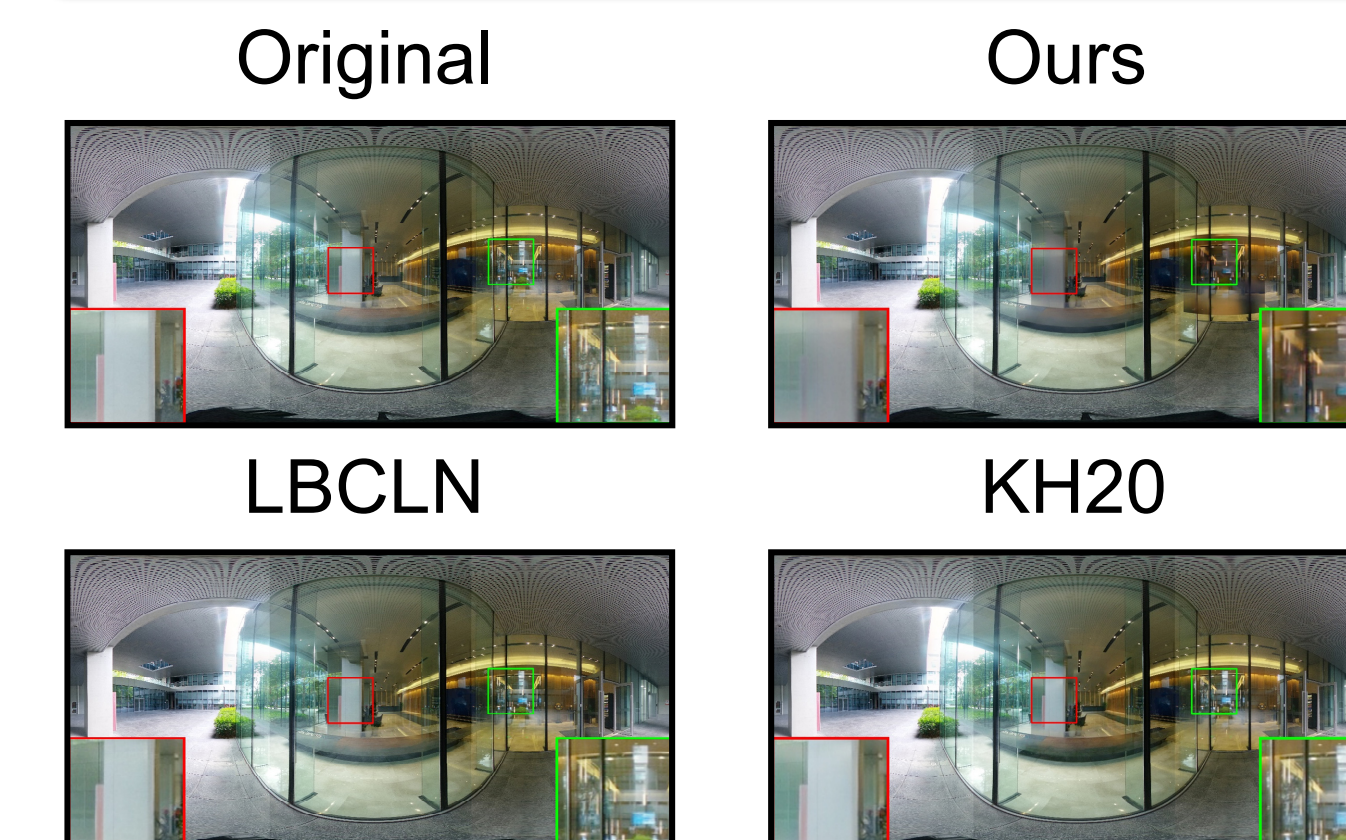


EXPERIMENTS

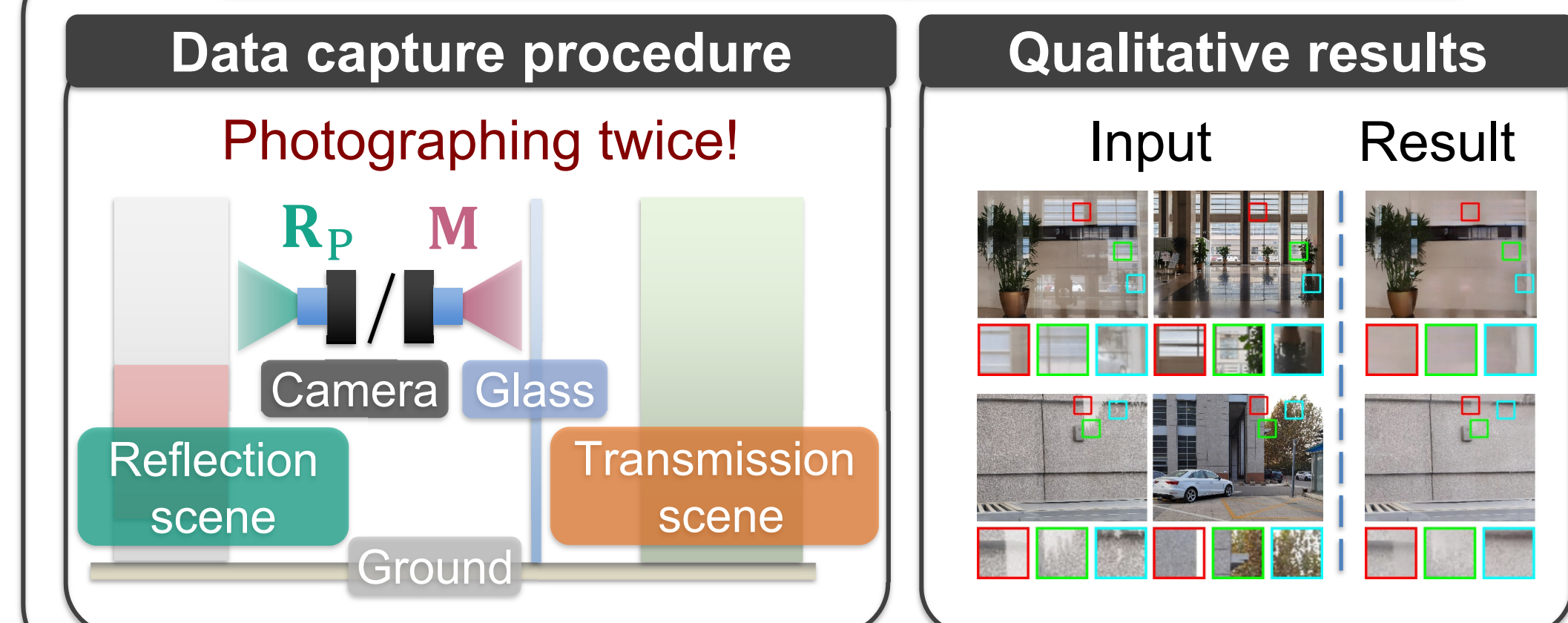
Quantitative (PORTABLE Dataset)

Method	Error Metric			
	PSNR \uparrow	SSIM \uparrow	NCC \uparrow	LMSE \downarrow
Ours	23.986	0.749	0.926	0.021
ICBLN	20.636	0.709	0.862	0.031
KH20	20.443	0.711	0.849	0.035
CoRRN	20.539	0.696	0.865	0.033
ERRNet	21.444	0.701	0.870	0.029

Qualitative (NATURAL Dataset)



Extension for casual users (PHONE Dataset)



CONCLUSIONS

- Present the first work to explicitly **relieve the content ambiguity** for reflection removal using panoramic images.
- Solve the **geometric and photometric misalignment** between reflection scenes in panoramic and glass-reflected views, accompanying with high-fidelity transmission recovery after alignment.
- Not only achieve superior performance over single-image methods but also **generalize well to casual users** without panoramic cameras.